

Quadratic Relations

Date: _____

Recall: Linear Relations of the form $y = mx + b$ have a degree of 1 and form a straight line when graphed.

EX: $y = 2x - 4$

Definitions:

Dependent Variable - The “y value” which is graphed on the vertical axis. This variable “depends” or is affected by a change in the independent variable.

Independent Variable- The “x value which is graphed on the horizontal axis. This variable is chosen or controlled(does not change as a result of the other variable).

Quadratic Relation- A relation in the form $y = ax^2 + bx + c$ which has a degree of 2. The graph of a quadratic relation is called a “Parabola” which is U shaped. Parabolas are “symmetrical” which means when folded in half the sides match up.

Vertex- The maximum or minimum point of the parabola - also known as the turning point.

Axis of Symmetry- the line that divides the symmetrical parabola in half (the fold line).

EX: The quadratic relation $h = -5.25t^2 + 42t + 2$ models the height (in meters) of a flare, compared to the time(t in seconds) it was fired into the air. Graph this parabola using a table of values and label the dependent variable, independent variable, vertex and axis of symmetry.

EX: Graph the following parabolas and label the vertex and axis of symmetry.

A. $y = x^2$

B. $y = 3x^2 + 6x + 1$

Finite Differences- differences found from the y-values in tables with evenly spaced x-values.

First Differences- calculated by subtracting consecutive y-values.

Second Differences- calculated by subtracting consecutive first differences.

EX: Calculate the first and second differences from the previous examples.

A. $y = 2x - 4$

B. $y = 3x^2 - 6x + 1$

Results: For Linear Functions, the first differences are the same.
For Quadratic Functions, the second differences are the same.